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and tools. From them science reconstructs everyday life in Mesopotamia as far back as 4000 B. C.

For instance, in 75-foot-high Tepe Gawra, the "Great Mound" on a plain near the Nineveh of Bible times, archeologists bored through 26 occupation levels, each representing at least a century or more of habitation and now compressed to a few feet of earth and rubble.

Why did ancients rebuild atop the same restricted mounds in a land where space was plentiful? Because the first settlers chose the best geographic sites—good water supply, convenient to agriculture and commerce. These advantages remained even after fire, flood, or war destroyed what man built. By tradition, also, descendants followed outlines of old buildings, especially temples, for they wanted protection from the gods and spirits the earlier town had appeased. Economic and social life centered around temples. Musicians strummed on lyres; wrestlers with huge jars attached to their heads grappled in the courtyards.

About 50 centuries ago, Mesopotamia's first settlers trampled matted, marsh-grown reeds to hold the oozing silt which rivers brought to their southern fields from Armenian mountains. Rich farmland replaced marsh. So much silt collected that one-time seaports now lie hundreds of miles inland. Spring floods perpetuated the well-known story of the Great Flood in the Book of Genesis and also the Babylonian's own legend in the Epic of Gilgamesh.

While fields in Lower Mesopotamia at the head of the Persian Gulf dried out, cultures in the northern highlands developed agriculture, architecture, and religion. Soon, quick-learning builders introduced the arch and wheel.

Near shrines of sun-baked brick—some covered with white plaster—painters ground natural pigments on stone palettes. Barbers shaved customers with straight razors made with slate handles and glass blades. On the grassy central plains of Akkad, near the spot where Noah's descendants built the Tower of Babel thousands of years ago, young shepherds called their flocks with flutelike pipes made of bone.

The fertile land's dawn farmers bred sheep and milked cows. They brought water from the rivers and irrigated grain and pasture crops. Centuries later, Mongol invaders destroyed the ancient water system Iraq now hopes to restore.

Squat Sumerians came to southern Mesopotamia in boats and tublike vessels called *gufas* that clattered with shiny copper axes, cosmetic sets, and frying pans. The new metal meant supremacy in industry and warfare over those who still used stone tools and weapons.

Early laws guided monarchs and safeguarded their subjects. Unlike Egyptian kings, regarded as supernatural beings, Mesopotamian rulers were servants, not sources of law. They sought advice from a Council of Elders in much the manner that President Eisenhower depends on his cabinet. Hammurabi, greatest king of the First Dynasty of Babylon, originated a code of human rights—instructions for family, society, government, commerce, arts, crafts, and professions. Foreigners copied it.

But all was not peaceful in Mesopotamia's long history. Civil wars raged. Some 4,000 years ago, so-called priest-kings, or *ensi*, overthrew powerful cities like Ur, home of the Old Testament's Abraham and place of

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First of a Four-Part Series

Cradles of Civilization, No. 1: Mesopotamia

In ancient Uruk, on the southern edge of bow-shaped Mesopotamia, a bearded craftsman chisels figures on a metal cylinder (below). At his elbow, a young apprentice rolls an impression on clay with a finished seal. Another seal cutter labors near by with stylus and clay.

The crude marks identify private property and temples of some 5,000 years ago. They represent Western man's first-known attempts at writing. From them evolved linguistics, mathematics, law, and literature—all to be passed on by Mesopotamia to Egyptians, Greeks, Romans, and modern man.

The prehistoric "Land Between the Rivers," little known a quarter of a century ago, gave metallurgy, the 360-degree circle, the 60-minute hour to Mr. Twentieth Century, and furnished his wife with cosmetics. Botanists still use terms first appearing in early Mesopotamia—cassia, chicory, crocus, hyssop, myrrh.

Archeologists digging in giant mounds in the fertile California-size strip hemmed in by the lazy Euphrates and turbulent Tigris rivers have unearthed costumes, jewelry, weapons, furniture, eating utensils, pottery,

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Slow! Danish Highway Dangerous When Wet

The glistening sand "road" below is considered dry. At high tide it lies five feet underwater. From a grass-grown dune on Manø Island, Johan watches the red fuel-oil truck crossing from the mainland. He glances at clouds scudding across the darkening sky. Will the storm beat the truck, piling water over shoals so that Hansen, the driver, can't get through with his load even at low tide?

To Johan and nearly 200 others on this sandy dot of land four miles off Denmark's North Sea coast, wind and tide are all-important. Twice a day, at the ebb, this soggy track, marked by a line of crooked tree branches, becomes passable. But storms can bog the truck; fog can hide the branches.

Johan knows that without truck-borne supplies following the "ebb track," little Manø would wither. Fuel oil powers churns at the dairy, making butter which goes to the mainland at low tide, earning a third of the island's annual income. Pigs and poultry bring in more cash. With it, the islanders must "import" hardware, cloth, and groceries for the cooperative store, school supplies, provisions for the inn, and building materials—for the North Sea wind twists the wood of Manø's stunted pines.

Johan and his fellow Manøvans speak a dialect that is strange to Danish mainlanders but familiar to islanders off Scotland's coast, indicating a common history of North Sea fishing. But Manø's fishing fleet has dwindled recently. The islanders' attention is focused on their tenuous tie with mainland necessities and luxuries. Over half the island homes have electricity; every one of them boasts a radio.

Now Hansen's truck is ashore and Johan runs to watch it unload. The driver must hurry in order to catch "water time," as Manøvans call low tide. If he misses, he must spend the night at the inn—a welcome event for the innkeeper whose hostelry is not often filled to capacity.

References—Manø may be located on the Society's map of Northern Europe. *National Geographic Magazine*, May 1952, "Thumbs Up Round the North Sea's Rim"; Nov., 1950, "Baltic Cruise of the *Caribbee*"; Feb., 1949, "2,000 Miles Through Europe's Oldest Kingdom"; Jan., 1940, "On Danish By-Lanes."

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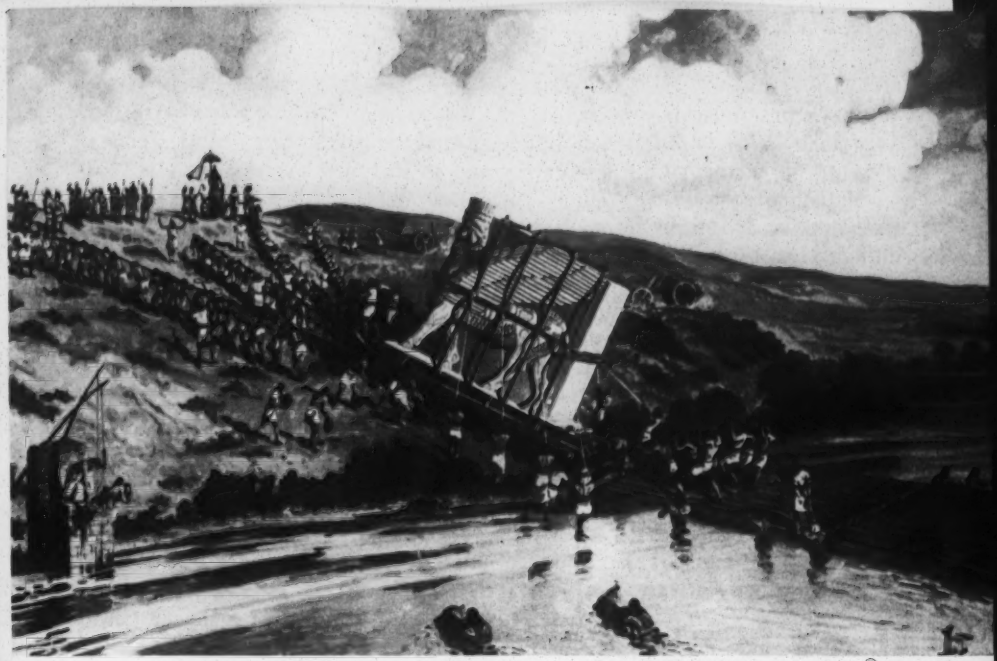

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Near Ancient Nineveh, Antlike Slaves Strain to Haul Ashore a 40-Ton Limestone Bull. Human Headed, It Will Guard an Assyrian Temple Against Evil

departure for his long trip to the Land of Canaan to found Jerusalem.

As Mesopotamia's civilization expanded, the country divided. Southern peoples called themselves Babylonians; northerners enlarged the great city of Ashur, nucleus of the future state of Assyria. Rivalry followed. Both powers fell under foreign rule for centuries. Kassites, tribesmen from the Iranian highlands, conquered Babylon. Ashur fell to Hurrians invading from Armenia to the north.

Both regions rose again to prominent world positions, their wheeling armies overrunning Judea in the campaigns described by the Old Testament. Nebuchadnezzar's Babylon armies seized Jerusalem and carried away Daniel among their captives. Assyria fell finally to the Medes and Babylonians. Persian King Cyrus captured Babylon in 539 B.C. Some 200 years later Babylon became world capital under Alexander the Great, but with his death the ancient country ceased to be.

Today in Mesopotamia, railroad trains whistle through the land of the Garden of Eden, rumbling past the site of the Hanging Gardens and the Babylon palace where the Hand wrote on the wall at the feast of Belshazzar.

Next week: Egypt

References—Mesopotamia (Iraq) is shown on the National Geographic Society's map of Bible Lands and the Cradle of Western Civilization. Write the Society, Washington 6, D. C., for publication order list. *National Geographic Magazine*, Jan., 1951, "Ancient Mesopotamia" (available as separate reprint, 50¢, and as part of 368-page book, *Everyday Life in Ancient Times*, $5.00 in U. S.; elsewhere $5.25); March, 1946, "Mountain Tribes of Iran and Iraq"; Sept., 1942, "Forty Years Among the Arabs"; Aug., 1941, "Bombs over Bible Lands"; Dec., 1938, "Change Comes to Bible Lands." *School and library discount price for Magazine issues a year old or less, 50¢; through 1946, 65¢. Write for prices of earlier issues.*

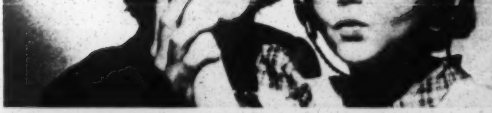
her reflection, the little girl (right) holds her hand against the teacher's cheek, feels her saying "oo." Touching her own cheek, she makes the sound herself. Because it is so hard for a deaf child to learn speech, constant practice is encouraged. The playground hums with the babble of voices as girls and boys make gleeful sounds or try out new words.

Each new sentence is a triumph such as hearing children and their teachers cannot experience.

In addition to the task of learning speech, Clarke pupils study subjects taught hearing children—geography, history, arithmetic. In the Upper School, corresponding to junior high, girls take cooking, sewing, arts and crafts; boys learn cabinetmaking, printing, drafting.

The pretty Clarke graduate (below) has accomplished an almost superhuman feat in learning command of the spoken language. Alexander Graham Bell called this "one of the greatest achievements in the world."

Dr. Bell and two other past presidents of the National Geographic Society—Gardiner Greene Hubbard and Gilbert Grosvenor—have served a total of 87 years on Clarke's board. To the inventor of the telephone his successful device meant more money "to teach speech to little deaf children." See "Deaf Children Learn to Talk at Clarke School," by Dr. Bell's granddaughter, Lilian Grosvenor, in *The National Geographic Magazine*, March, 1955.



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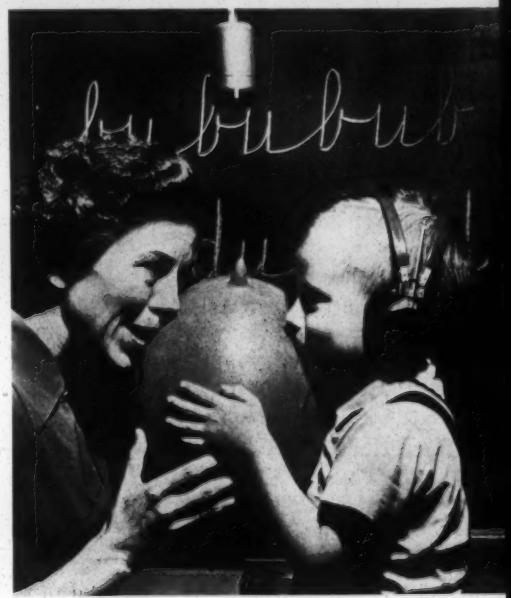
Science Triumphs over Silence at Clarke School

Seated in a semicircle, children at Clarke School for the Deaf learn to "hear" with their eyes. Alexander Graham Bell, inventor of the telephone and pioneer in educating the deaf, wrote of this possibility 80 years ago. At Clarke it now is a proud achievement. Founded in 1867 at Northampton, Massachusetts, the school was one of the first two in the United States to use the oral method—teaching by lipreading and speech (illustration, cover).

Deaf children don't talk because they can't hear and so have no way of knowing what speech is like. To learn to speak, any child must build up a vocabulary by associating words with objects. The toy house (top) helps Clarke pupils learn words in common use—bird on the roof, trees, grass, duck on a pond.

Each child has a hearing aid which conveys vibrations even though the wearer may be totally deaf. By vibrations children learn the rhythm of sentences and how to regulate their voices. By watching the teacher's face, the position of her tongue, teeth, lips, cheeks, they learn to form words themselves and to produce sounds. One of the first lessons is to develop a natural voice quality. The teacher (right) holds a balloon against her face and repeats "Buh, buh, buh." The small boy feels with cheeks and fingers the vibrations of her voice and mimics her.

The mirror is another help. Looking at her reflection, the little girl (right) holds her hand against the teacher's cheek, feels her saying "oo." Touching her own cheek, she



of water. Gates close behind her and water sucks around her laden hull. The dripping walls of the lock seem to grow in height as the ship slowly drops. Then gates ahead swing open, her engine throbs, and majestically she moves through the long ditch to emerge on the St. Marys River safely below the rapids (illustration, above). She has literally gone downstairs on a giant step of water.

The Soo Canals—four American and one Canadian—perform this minor miracle about 90 times a day during eight ice-free months of each year. Despite the short shipping season on the Great Lakes, the Soo handles more tonnage than Panama and Suez canals together—with Manchester and Kiel canals thrown in. Just a century ago the Soo Canal opened up Lake Superior to commerce with the lakes and the ocean beyond. Today, as spring's sun thaws the last stubborn ice of Great Lakes shipping lanes, the world's busiest locks are back in business.

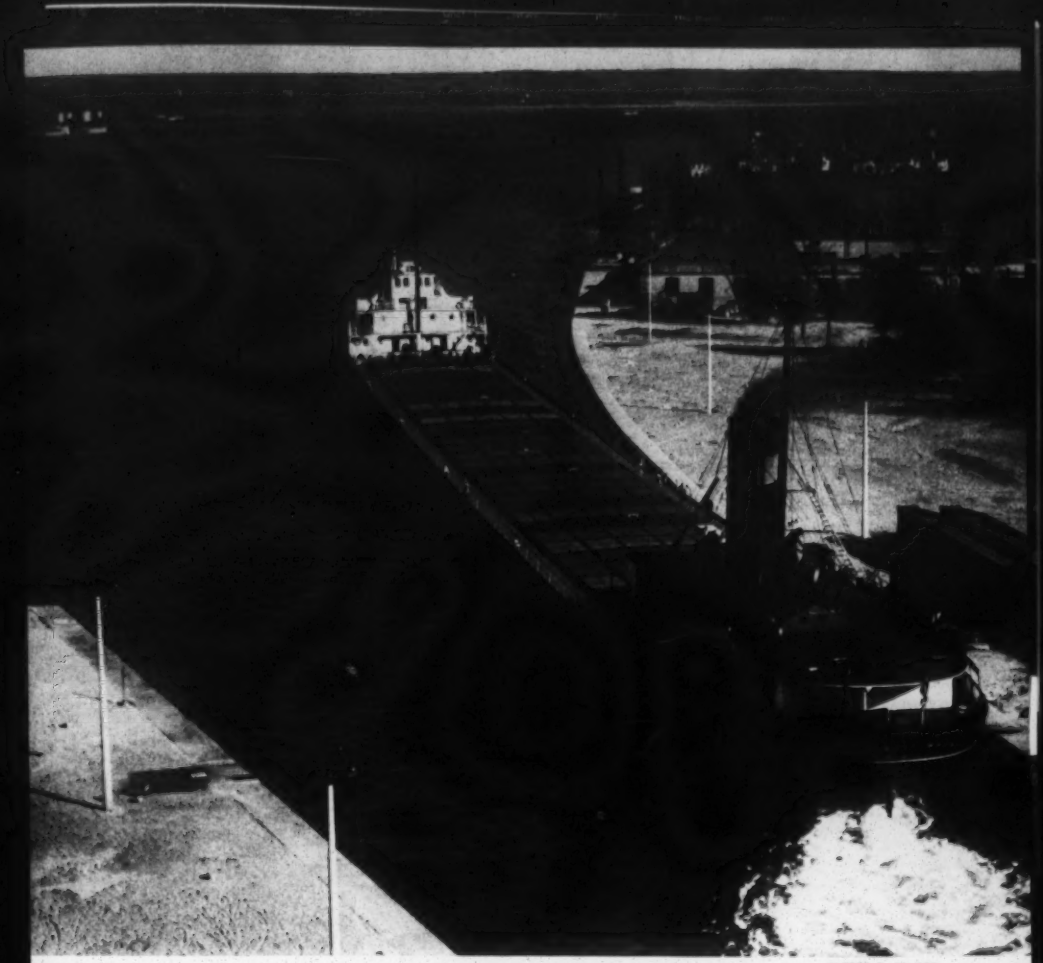
Long-hulled vessels loaded with ore from the Mesabi Range plow eastward to feed manufacturing plants in Detroit, Toledo, Cleveland, New York State. Grain freighters, riding high after unloading at Buffalo, thrash up the St. Marys to the locks. Hoisted up, they face Lake Superior's bleak winds on their way to reload at Duluth.

Sault Ste. Marie was a quiet village 102 years ago. Sailing vessels docked beside the beginning of the rapids to unload cargoes of fish, wheat, ore. On horse-drawn trams, produce was trundled through town to a point below the rapids where ships from Lake Huron stowed it away. Some-

RALPH GRAY, NATIONAL GEOGRAPHIC STAFF

Oxen towed fur-laden canoes into this tiny lock of the old Canadian canal. It saved trappers from a grueling portage around the worst of St. Marys rapids. Originally built of wood, it was burned in 1814. Now restored in stone, the lock is a tourist attraction at Ontario's Sault Ste. Marie, a step away from the huge modern lock shown on next page. Many old canals linking the Great Lakes to the Atlantic are too shallow for modern vessels. The St. Lawrence Seaway project would dredge channels and dig new canals at least 27 feet deep. Inland cities would become ocean ports, business at the Soo would hum faster than ever.

Last of the Rivers of the World series, "The Ganges," will appear in issue No. 30, May 16, 1955.



ALFRED T. PALMER

Century-Old Soo Locks: Heartbeat of the Lakes

With Lake Superior's wind-driven waters astern, a 600-foot freighter slides toward the clustered smokestacks of Sault Ste. Marie. Her destination: Cleveland. Her course lies down the St. Marys River, through Lake Huron, and into Lake Erie.

The catch is, Lake Huron's level is about 19 feet below that of Lake Superior. A chip of wood could negotiate the drop by simply tumbling through the rush of shallow water that boils between the twin American and Canadian cities of Sault Ste. Marie (the French world "sault"—pronounced "soo"—means "rapids"). But the freighter, her hold crammed with 15,000 tons of iron ore, must do it another way.

She slips between red and black buoys, following a beacon's beam which guides her clear of the rushing river. A blinking signal light leads her toward a gaping doorway in the shore line. Her engine-room telegraph clangs. Hand lines snake out from her deck and heavy ropes follow, smacking water as they are hauled shoreward. Like a tired work horse entering a stall, the ponderous ship nudges gently into a long, narrow corridor

AMOS BURG

Blessings Pour on Colombia's Happy Valley

Baron von Humboldt, famed German naturalist-explorer, stumbled onto Colombia's Cauca Valley in 1801. After making his way up the Magdalena River, he set out ambitiously to cross the towering mountain ranges that loomed to the west.

Between the central and western ranges he found a narrow strip of flood-plain, unbelievably fertile, blessed with a perfect climate, where peasants in homespun grazed Spanish cattle on lush meadow grasses. "The paradise of America," was the baron's verdict.

Modern travelers reach the Cauca Valley with a good deal less trouble, thanks to Colombia's efficient airline service. But once they sniff the clear subtropical air, tempered by 3,000 feet of elevation to the consistency of a June morning, they're apt to agree with von Humboldt's generous opinion.

"The Valley," as its inhabitants proudly call it, is a 200-mile-long Garden of Eden dimpling South America's western shoulder not far from where the continent nudges the Isthmus of Panama. Starting near the source of the tumbling Cauca River, the Valley's deep bottomland is enriched by volcanic ash carried downstream from Mount Puracé which, say the natives, erupts "whenever there's a change in the weather." Like a green ribbon, the Valley winds northward to the town of Cartago, where the river spills into the jungle on its way to join the Magdalena, Colombia's Mississippi.

The Valley's present-day farmers need no fertilizer to grow 15-foot stalks of sugar cane (illustration, above), said to have the world's highest sugar content. Other crops thrive: tobacco, rice, cotton, citrus fruits, cacao, coffee, to name a few. Cattle, now carrying the bloodstream of the Texas zebu breed, fatten on thick pasturage. A riot of flowers grow in profusion.

To 2,000,000 *Caucanos*, nature's bounty has brought not only a pleasant way of life, but also the energy to seek improvements. Cali, the Valley's chief city and focal point for transportation routes, pulses with light industry. It could become a humming industrial center, say the residents. Rich as they are, valley acres are occasionally swept by floods. Beneath the deep soil lie untapped resources of coal, iron, and gold.

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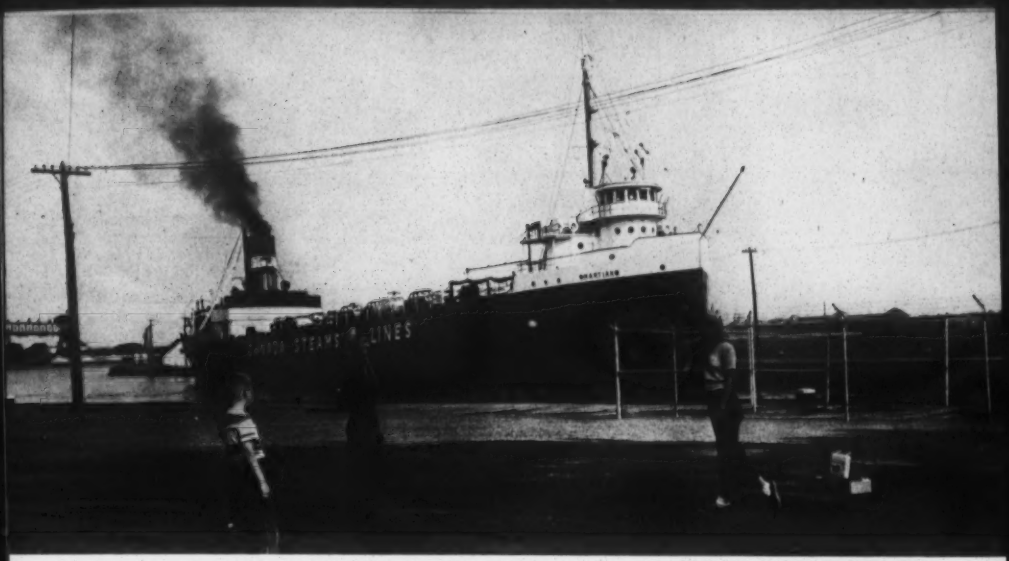

RALPH GRAY, NATIONAL GEOGRAPHIC STAFF

Entering Canada's Lock, This Freighter Will Unload Its Deck Cargo of Cars, Then Rise on the Great Water Step and Steam out into Lake Superior

times horsecars hauled a complete schooner through town, to the delight of its 1,000 inhabitants.

One lock had been dug on Canada's shore in 1797, allowing fur-laden canoes or bateaux to bypass the rapids without portaging. During the War of 1812, American soldiers destroyed it. Later American attempts to build a canal fizzled. Statesman Henry Clay thundered that the project would be "a work quite beyond the remotest settlement of the United States, if not in the moon."

But as the lake-borne flow of mineral ores from Minnesota and Wisconsin increased, so did the need for a better method of skirting St. Marys rapids. Charles T. Harvey, 25-year-old salesman for a Vermont firm, watched the squealing horsecars roll through Sault Ste. Marie while he was convalescing from typhoid fever. He decided to dig a canal.

With eastern financial backing and a contract with the State of Michigan, Harvey put gangs to work in 1853. Through two bitter winters and a cholera epidemic they labored, in temperatures as low as 30 below zero. For replacements, Harvey recruited immigrants disembarking at New York. He patched broken equipment on the spot. And on June 18, 1855, the *Illinois* steamed through the two locks of the finished canal en route to Lake Superior. This June's centennial will celebrate that epic passage.

Harvey's canal was a good one. It carried 14,500 tons of freight its first year, a million and a half tons 20 years later. But that growth of commerce was too much for it. In 1881 a new lock replaced it, owned and administered by the United States Government, as are the four big, modern canals today which, with the Canadian canal, handle 85 percent of the iron ore produced in the United States.

References—The Soo Canals may be located on the Society's maps of The Great Lakes Region of the United States and Canada, and the Northeastern United States. *National Geographic Magazine*, March, 1952, "Work-hard, Play-hard Michigan"; Dec., 1944, "Michigan Fights"; March, 1928, "Michigan, Mistress of the Lakes."

To develop the full potential of its "happy valley," Colombia's government plans South America's first regional project based on the famous Tennessee Valley Authority of the United States. Already David E. Lilienthal, former chairman of the TVA, has visited the Cauca Valley on the invitation of Colombian President Rojas. The World Bank is studying the scheme with an eye to helping finance it. Engineering firms already have contracted to start preliminary work. Within a few days the final charter for the project is due for approval.

LUIS MARDEN, NATIONAL GEOGRAPHIC STAFF

Cauca River Plunges Past a Senorita and Her Choice Valley Fruits, Picked near Popayan, City of Poets

With dams, irrigation canals, and hydroelectric stations, the "Corporation of the Cauca" intends to keep the lowlands from flooding. They will divert water to neighboring drought-ridden areas and funnel electric power into valley towns, boosting their industrial output. After four centuries of gradual, easygoing progress, Cali might leap ahead to become one of the continent's leading cities. Its present population is about 150,000.

By supplementing natural fertility, the Valley's land could serve as a breadbasket for all Colombia. The 18,000-square-mile area under consideration extends westward to the Pacific port of Buenaventura, linked to Cali by railroad.

Mr. Lilienthal, in his role of advisor to the Colombian government, urges quick completion of some of the project's details so that their impact may strike while enthusiasm runs high. In two years, he feels, Colombians could see results. Long-range features of the complete scheme might not have a noticeable effect for two decades.

References—Colombia is shown on the Society's map of South America. *National Geographic Magazine*, Sept., 1952, "Jungle Jaunt on Amazon Headwaters"; Aug., 1948, "Keeping House for a Biologist in Colombia"; May, 1947, "Cruising Colombia's 'Ol' Man River'"; Oct., 1940, "Hail Colombia!"